WGIC POLICY REPORT: 2021-01

Geospatial AI/ML Applications and Policies: A Global Perspective

WGIC
World Geospatial Industry Council

Welcome to the WGIC Policy Report Launch

Tuesday, 13 April 2021
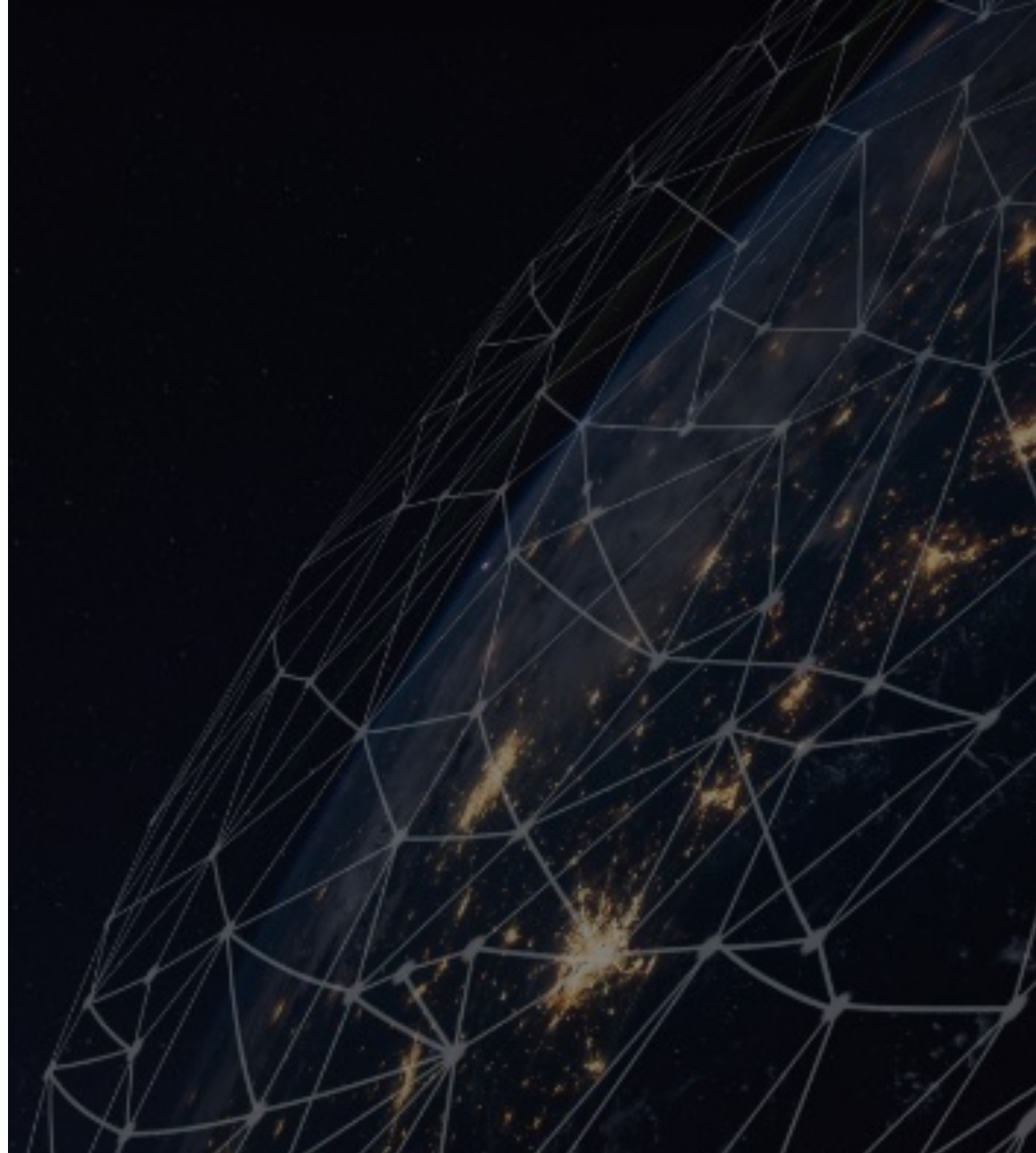
Welcome Address & Introduction to WGIC

Barbara Ryan

Executive Director

WGIC

WGIC
World Geospatial Industry Council

A Global not-for-profit Trade Association of Private Sector Companies working in the geospatial ecosystem.

Patron Members

Corporate Members

Associate Members

WGIC Partner Organizations

buildingSMART International

European GNSS Agency

ISO/TC 211

International Telecommunication Union

Open Geospatial Consortium

United Nations Statistics Division

World Federation of Engineering Organizations

AI has the potential to disrupt every sector of society in both anticipated and unanticipated ways – US Congress.

Program Agenda:

16:00 - 17:30 hrs.

- **Welcome Address & Introduction to WGIC** (5 minutes)
  - **Barbara Ryan**, Executive Director, WGIC

- **Opening Remarks on WGIC's Policy Work & Report Launch** (10 minutes)
  - **Arnout Desmet**, Vice President Maps, TomTom & Chair - WGIC Policy Development & Advocacy Committee

- **Executive Overview of the Report** (15 minutes)
  - **Lokendra Chauhan**, Founder, Qen Labs Inc (Author of the report)

- **GeoAI Expert Presentations & Panel Discussion** (60 minutes) *(Moderator: Barbara Ryan)*
  - **Kumar Navulur**, Sr. Director of Strategic Business Development, Maxar Technologies
  - **Jim Van Rens**, Senior Vice President, Riegl International
  - **Stephanie Leonard**, Head of Traffic Innovation and Policy, TomTom
  - **Siva Ravada**, Vice President – Product Development, Oracle
  - **Prof Shashi Shekhar**, McKnight Distinguished University Professor, University of Minnesota
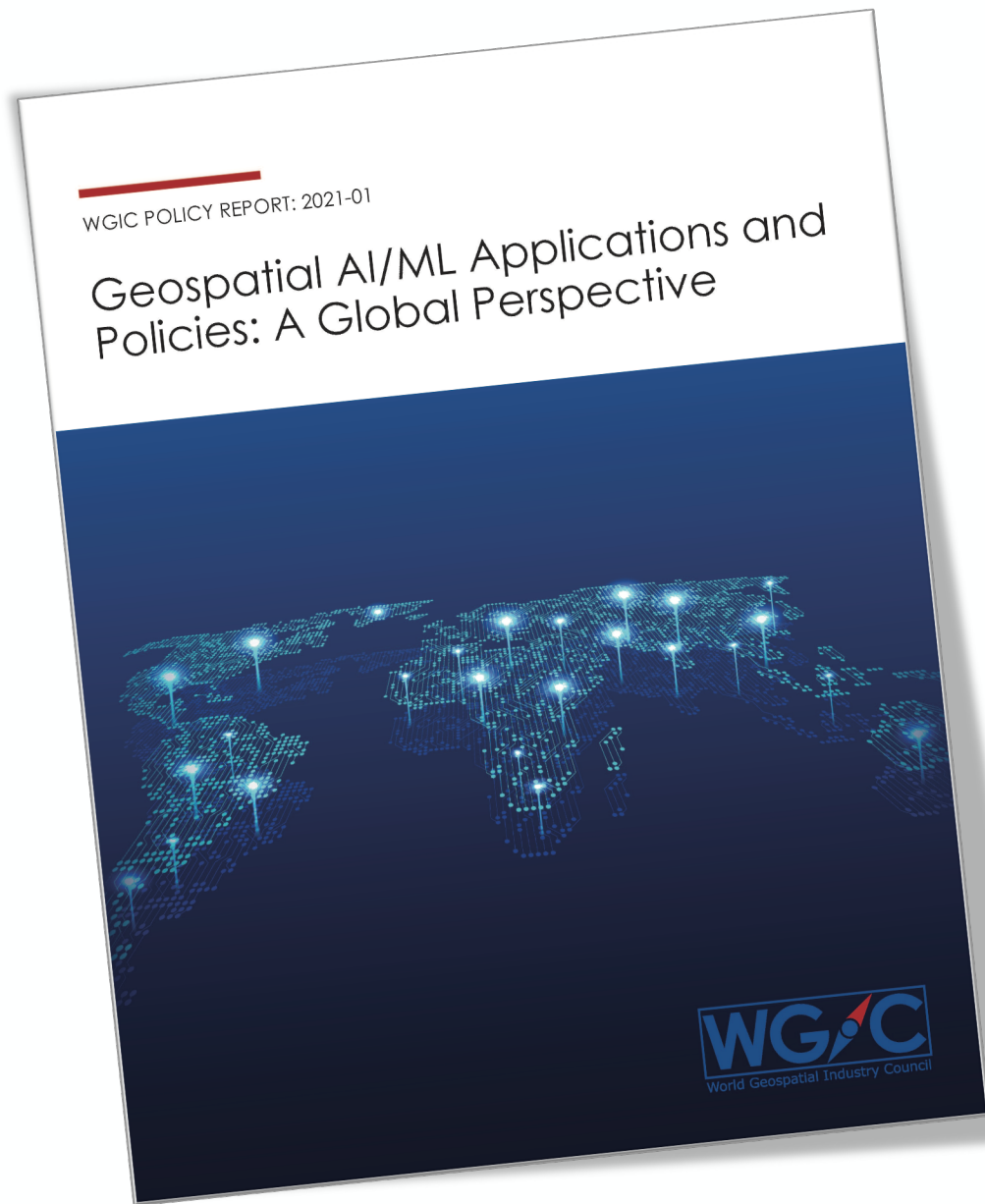
- **Closing Remarks**
  - **Arnout Desmet**

Opening Remarks on WGIC's Policy Work & Report Launch
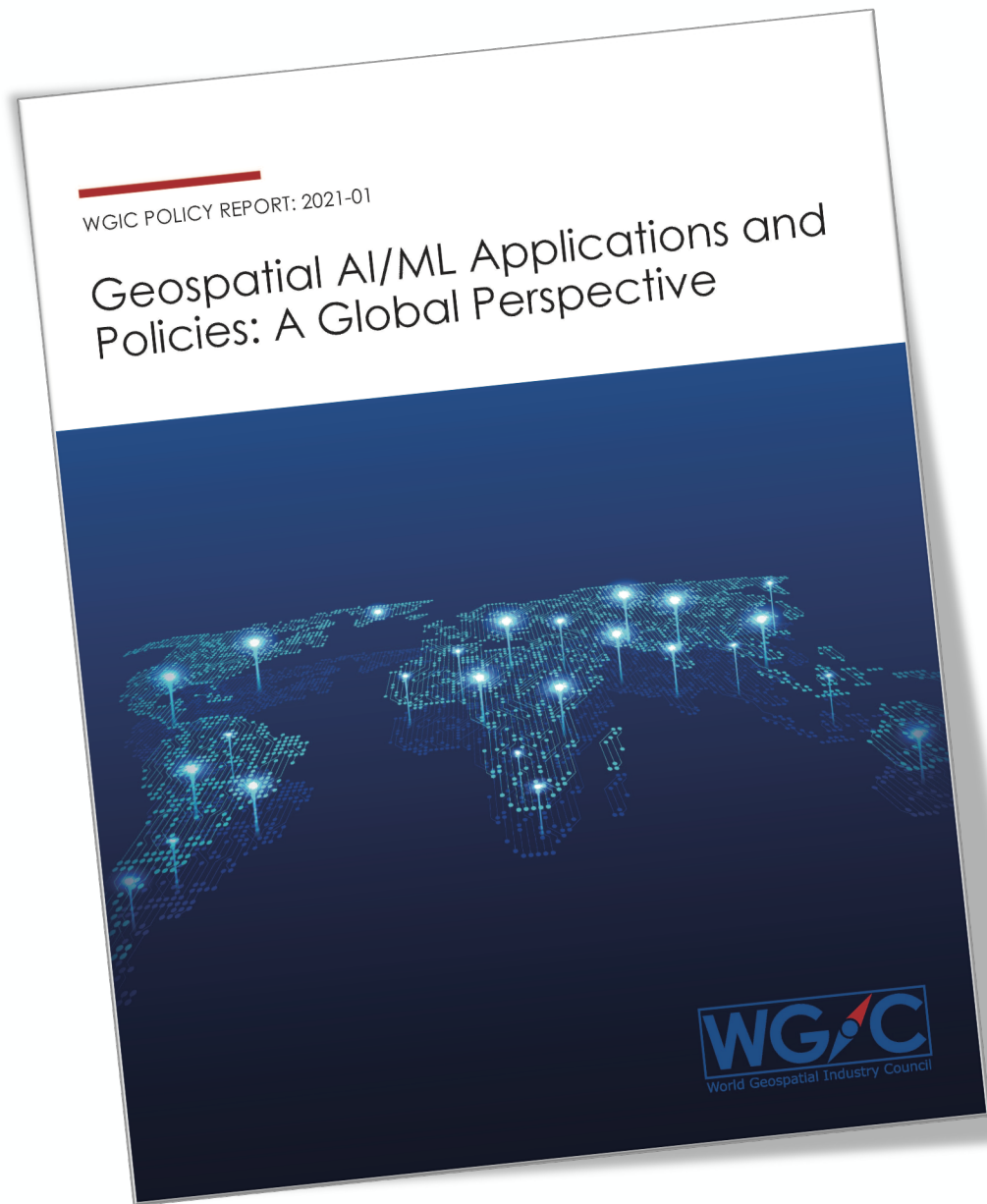
Arnout Desmet

Vice President - Maps

TomTom

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The report is now available for download

go.wgicouncil.org/geoai-21

Executive Overview of the Report

Lokendra Chauhan

Founder

Qen Labs Inc

Study Methodology

Desk Research

- Geospatial industry and GeoAI

- AI/ML technology landscape

- AI Regulatory landscape

Consultations

- Interviews with WGIC Members and Experts

- GeoAI use-cases
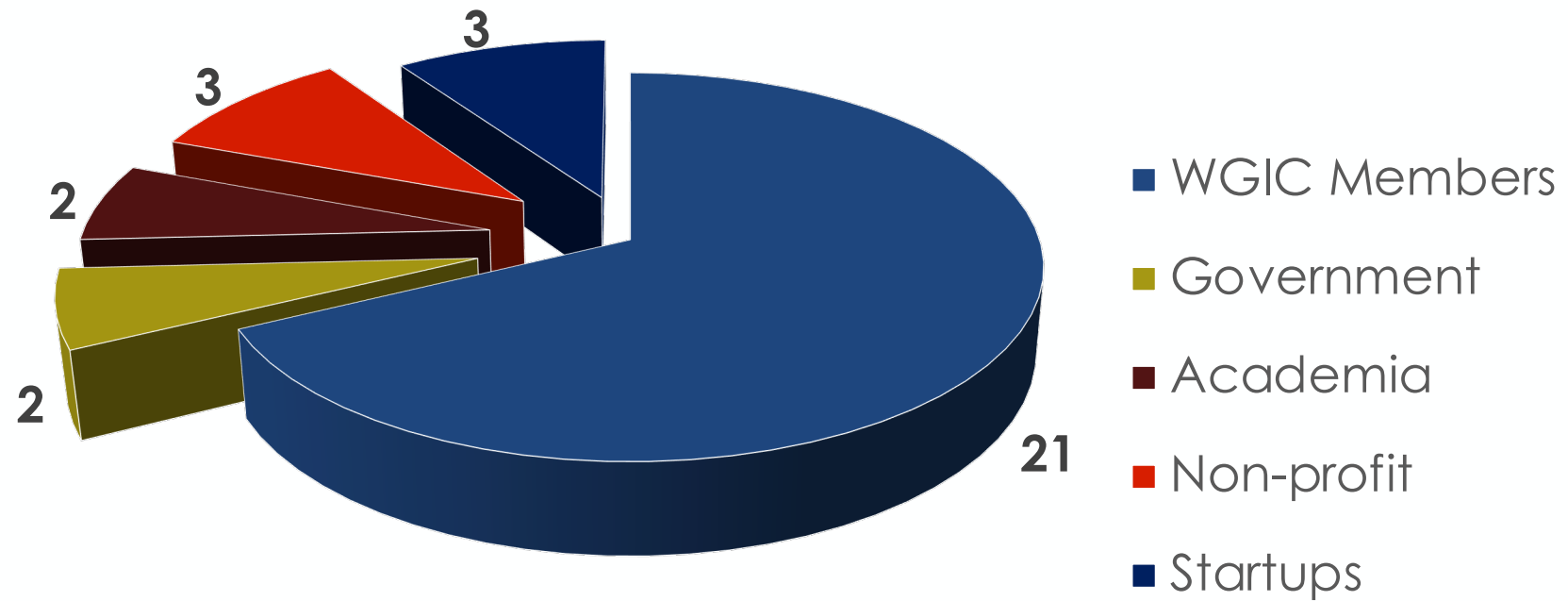
- Successes, lessons and concerns

Report

- Report on AI/ML in geospatial industry and policy landscape

Research Interviews
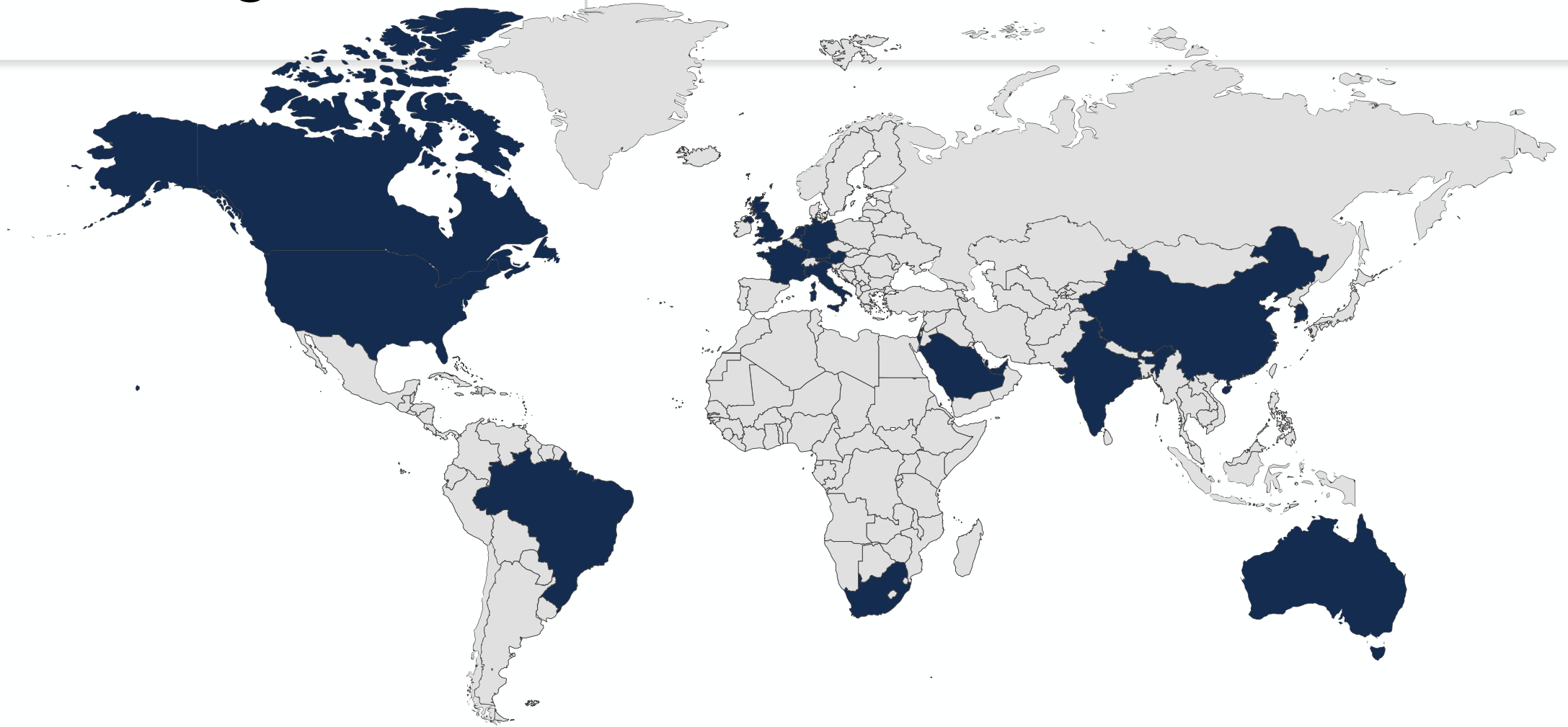
- WGIC Members
- Government
- Academia
- Non-profit
- Startups

Globally Representative Coverage

Countries covered in the Study

What is AI and GeoAI?

RULES →
DATA → **SOFTWARE** → ANSWERS

DATA →
ANSWERS → **ARTIFICIAL INTELLIGENCE** → RULES

Location, time, spectral bandwidth, etc.

Geospatial DATA →
ANSWERS → **GEOSPATIAL AI** → **RULES**

Proximity info, labels describing the object, etc.

Observed attributes imply this object is a road, farm, vehicle, etc.

Everything Happens Somewhere

Legal - Ownership, encumbrances, etc.

Address, etc.

Landuse, boundaries, etc.

IOT
INTERNET OF THINGS

USER GENERATED CONTENT
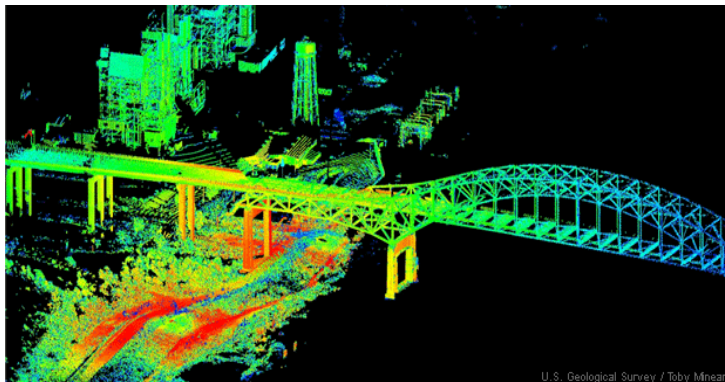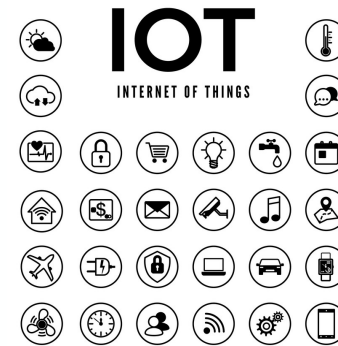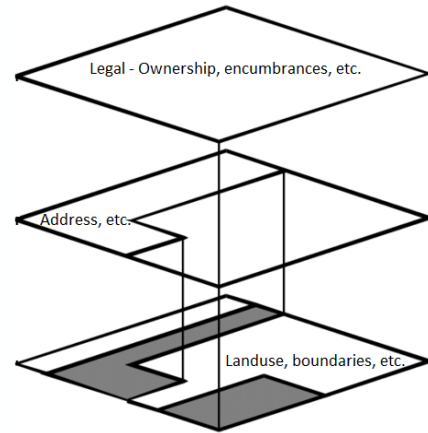
U.S. Geological Survey / Toby Minear

Number of Active Satellites

25,000 +

2005   2018   2019   2020   Planned
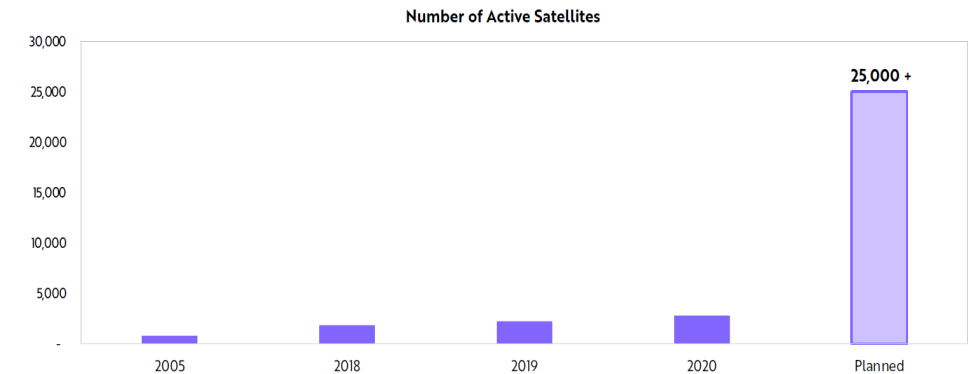
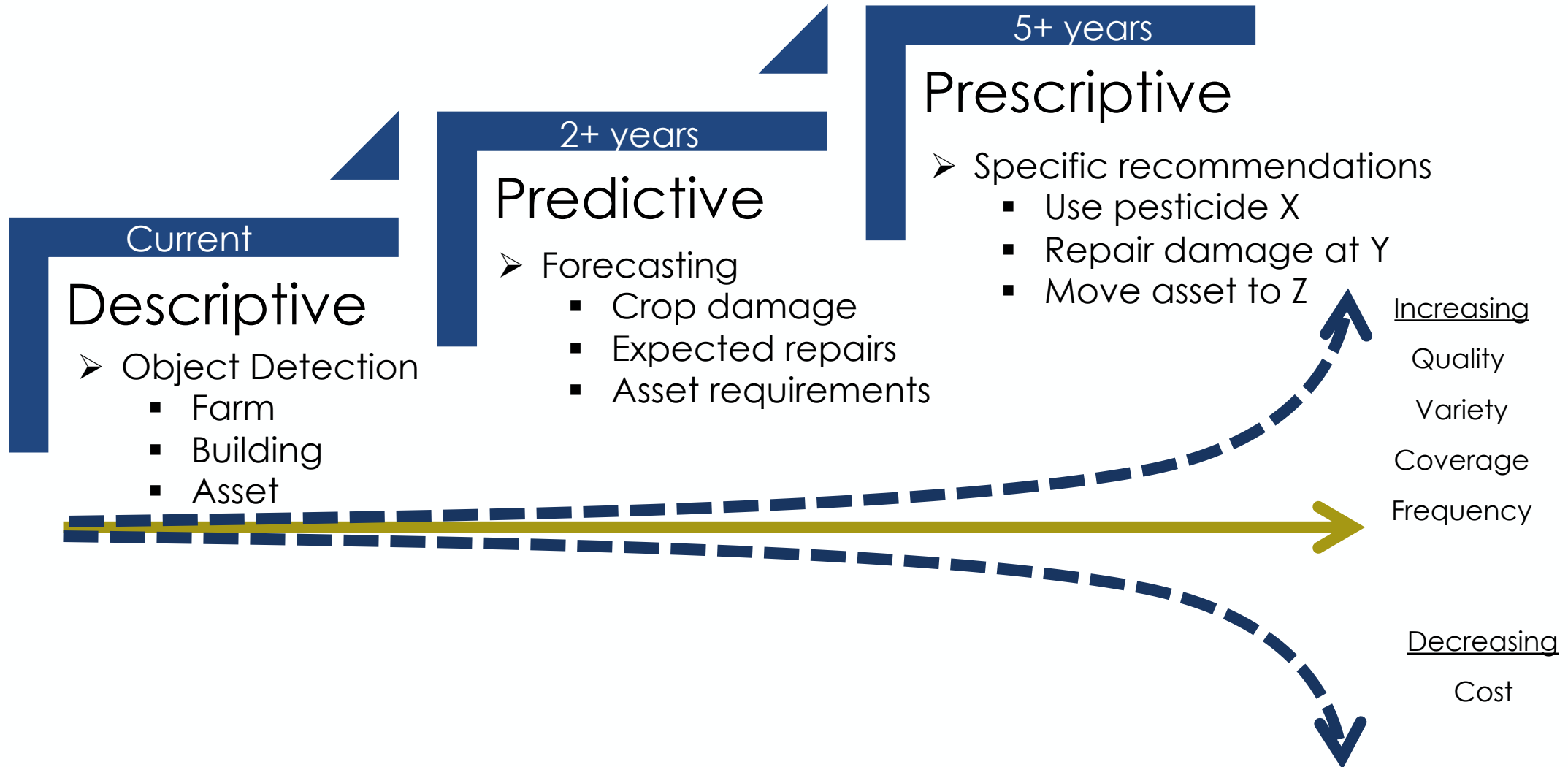Forecasts are inherently limited and cannot be relied upon.
Source: ARK Investment Management LLC, 2020 based on data sourced from: Union of Concerned Scientists Satellite Database.

GeoAI Trends

Current

Descriptive

➤ Object Detection
- Farm
- Building
- Asset

2+ years

Predictive

➤ Forecasting
- Crop damage
- Expected repairs
- Asset requirements

5+ years

Prescriptive

➤ Specific recommendations
- Use pesticide X
- Repair damage at Y
- Move asset to Z

<u>Increasing</u>

Quality

Variety

Coverage

Frequency

<u>Decreasing</u>

Cost

AI Policy Landscape

	AUSTRALIA	BRAZIL	CHINA	EUROPEAN UNION	INDIA	ISRAEL	QATAR	SAUDI ARABIA	SINGAPORE	SOUTH KOREA	UNITED ARAB EMIRATES	UNITED KINGDOM	UNITED STATES OF AMERICA
AI Policy/Strategy Documents or Whitepapers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Enacted AI Laws (sector agnostic)				✓						✓			
Enacted AI Laws (sectoral/issue specific)	✓					✓			✓				
Regulatory Proposals/Draft Laws on Privacy		✓	✓			✓	✓						
Enacted Laws on Data Protection/ Governance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Soft law on AI (Guidelines and Directives)	✓			✓	✓			✓		✓			

Recommendations

Organization Level	Alignment with emerging consensus around the ethics and governance of AI
	Self-regulate in good faith to increase trust
Government Policies	Should not restrict innovation
	Should be easily enforceable and adaptive to developments in AI

Recommendations

Geospatial Industry	Classify use cases by the risk of potential harm to enable calibrated policy responses
	Create tests and checklists for self-audit of GeoAI applications
	Develop training datasets, benchmarks and tests for measuring GeoAI performance

GeoAI Expert Presentations & Panel Discussion

In the geospatial domain, a wide range of AI/ML use-cases and opportunities emerge with great promise in terms of innovation, break-through efficiency gains, and addressing previously unsolvable problems.

While the demand for geospatial AI/ ML applications is high, the risks due to the scarcity of sufficiently trained data scientists and engineers are also high relative to the consumer tech industry.
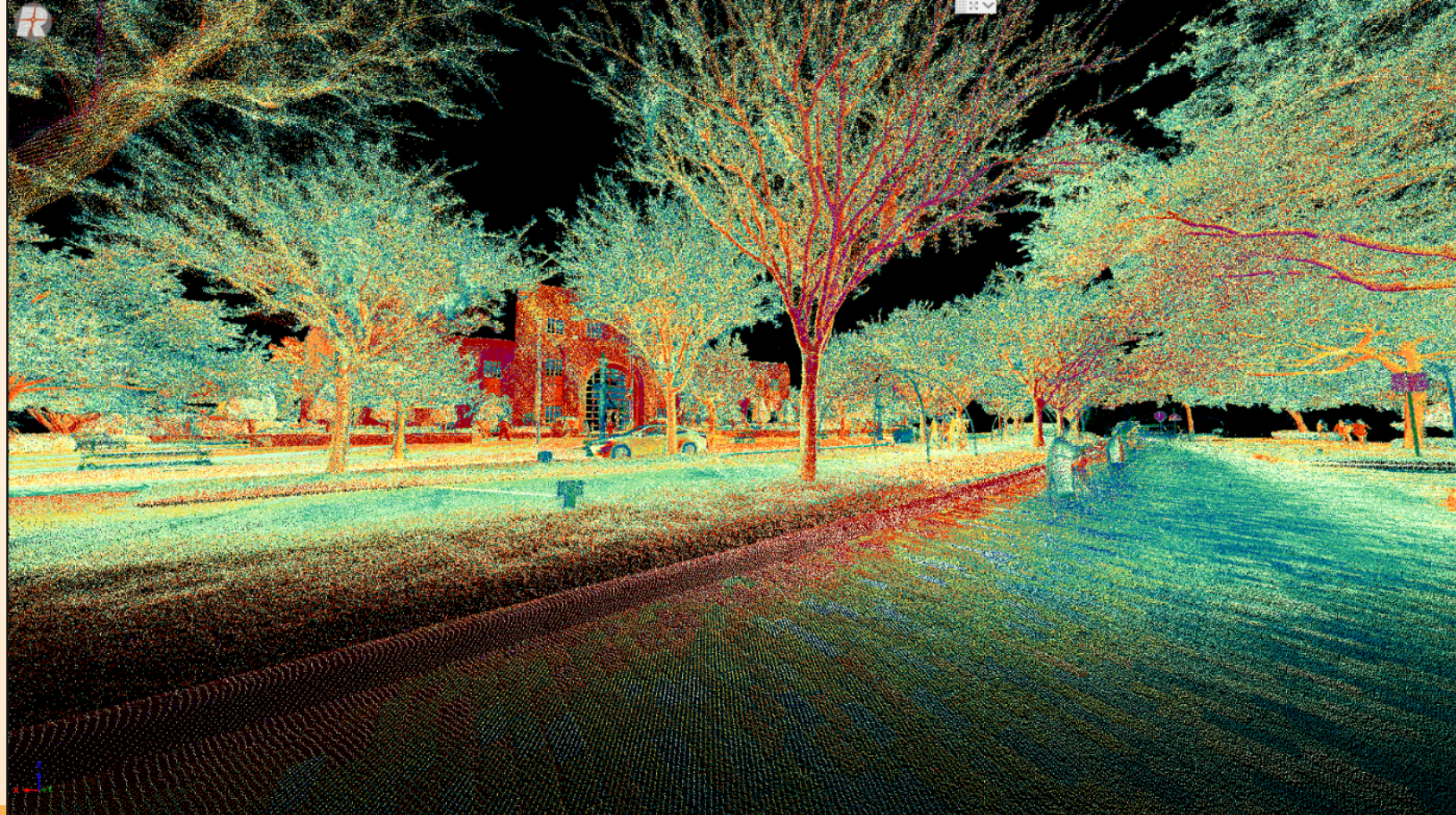
Next Generation of Integrated Data

James Van Rens

Innovation in 3D

RIEGL®

High Fidelity - High Resolution/High Density/High Precision

- LiDAR provides accuracy and completeness of geospatial data. LiDAR calibrates the integration of other technologies to provide high fidelity data and visualizations.

- High fidelity data is a prerequisite for Machine Learning Techniques to represent the real world and to facilitate ML techniques.

- For GEO AI/ML to be effective and have a faster adoption rate, high-fidelity data information allows the algorithms to see the assets without distortion and learn correctly.

- Data veracity, reliability, and trust is critical. The need for global standards is paramount. As the technology and the data change—so too must the standards, which must be authoritative and relevant.

www.rieglusa.com Innovation in 3D

RIEGL®

AI and Predictive Models based upon ML

- Machine learning will handle many mundane tasks very effectively. Artificial intelligence will provide us options to analyze and assess the correctness of the models we use to define our world.

- Authoritative surveying and mapping information is a planning requirement. For example, geospatial location data is at the heart of smart cities. ML Predictive models will be crucial for city managers and planners. The Internet of Things is a part of this new approach. For example. High-fidelity data and IOT sensor networks allow for predictive modeling on routing which is critical to emergency response.

www.rieglusa.com Innovation in 3D

AI Expert Presentations

Stephanie Leonard

Head of Traffic Innovation and Policy

TomTom

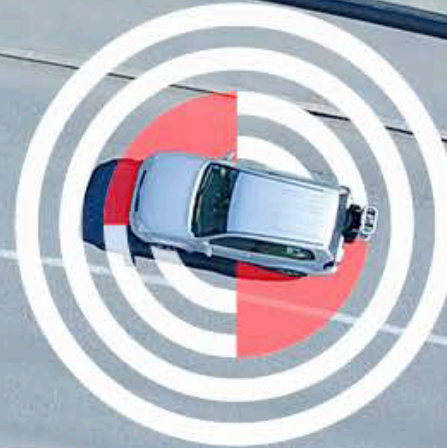# Geospatial AI/ML Applications and Policies – A Global Perspective, WGIC

Stephanie Leonard

Head of Traffic Innovation and Policy

TomTom

13.04.2021

7th of December, 2020

TomTom & AI

How we use AI TODAY

How we want to use AI TOMORROW

1. Tools that enable production automation i.e. map feature extraction & GDPR compliancy

2. Product analytics i.e. improve estimated travel time, road closure detection, ETT, cost optimization, data consumption prediction, etc.),

3. Insights for making a better decision about the features and products.

1. Increased use of satellite data & fully automated feature extraction for some basic features

2. Maps updates within hours

3. User behavior analytics i.e. driver profiles and personalization features i.e. destination prediction

Regulating AI – TomTom Perspective

- High Risk vs Low Risk AI Applications

- Definition of AI

- Horizonal vs Vertical Approach

- Access to Data - FRAND

- Ethical Considerations

Organizations should lead by example, and in good faith, build norms for ethical use of AI, so that customers, policymakers, and citizens at large, have strong reasons to trust the geospatial industry.

AI Expert Presentations

Siva Ravada

Vice President – Product Development

Oracle

Broaden the access to Spatial AI/ML

- Developing ML models is very time consuming
  - It does not make sense for every agency and customer to try and develop these models to solve the same common problems
  - Establish ML model sharing mechanisms to help adopt this technology
- Without data access, innovation in Spatial AI/ML will be hampered
  - Training data is one of the most important drivers of success
  - Establish data sharing mechanisms, data trusts, etc. specifically for Spatial AI/ML applications
- Encourage development of no-code/low-code tools built on Spatial AI technology
  - Common users should be able to use this technology without the need to hire AI experts to use these tools
- Different agencies will have success stories, lessons learned and best practices
  - Establish trusted mechanism to share and exchange these lessons, best practices, pitfalls and blind spots as identified by early adopters
  - Establish database of reference implementations that solve common local and state government problems
- Facilitate better understanding of the skills necessary to leverage AI/ML at state and local agencies

GeoAI can provide public agencies and businesses the ability to make decisions that will result in sustainable development and growth/ preservation of natural resources.

GeoAI is a highly interdisciplinary field bridging disciplines like computer science, engineering, statistics, and spatial science. As this field focuses on real-world problems, the impact on society and the economy is very high and critical.
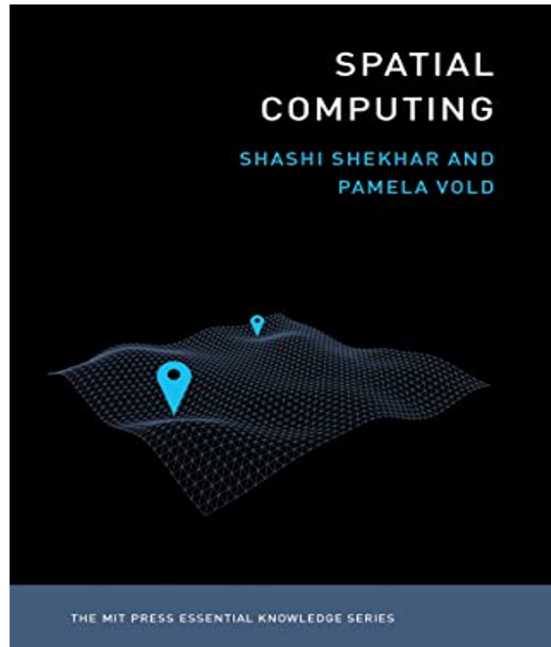
What's Special About GeoAI?

Shashi Shekhar

McKnight Distinguished University Professor, Univ. of Minnesota

www.cs.umn.edu/~shekhar

SPATIAL COMPUTING

SHASHI SHEKHAR AND PAMELA VOLD

THE MIT PRESS ESSENTIAL KNOWLEDGE SERIES

UNIVERSITY OF MINNESOTA
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Spatial Revolution

- GPS & Location traces
  - 2 billion GPS receivers today (7 billion by 2022)
  - Reference clock for telecom, banks, …
  - Help understand Spatio-temporal patterns of life
- (Nano-)Satellite Imagery, …

The World Economy Runs on GPS. It Needs a Backup Plan

Bloomberg Businessweek

July 25, 2018, 4:00 AM CDT

ENSURING RESOURCE AVAILABILITY

Advanced technology, including many types of Earth information, will unlock up to *$1.6 trillion* in economic savings for energy generation and use by 2035.

Satellite observations can also help ensure water availability, which is particularly important to the 20% of the world now living in areas of water scarcity.

McKinsey Global Institute

The study estimates that the use of personal location data could save consumers worldwide more than $600 billion annually by 2020. Computers determine users' whereabouts by tracking their mobile devices, like cellphones.

The New York Times

Published: May 13, 2011

Source: Y. Xie et al., Transforming Smart Cities With Spatial Computing, Proc. IEEE Intl. Conf. on Smart Cities, 2018.

AI promise for Spatial Problems

- Cheaper, faster, and bigger Maps
  - Ex. US Natl. Wetland Inventory - $400 M over 40 years (last century)

- Inverse Geo-Problems
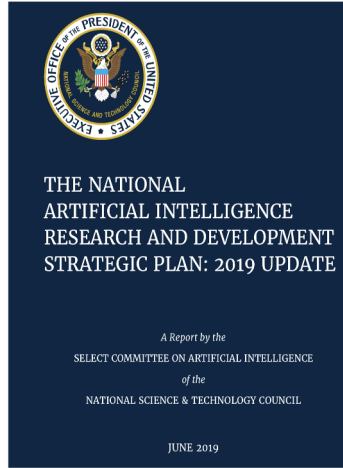
- Geo-Content based Querying

- But many hurdles

Q? Where am I?

http://maps.google.com
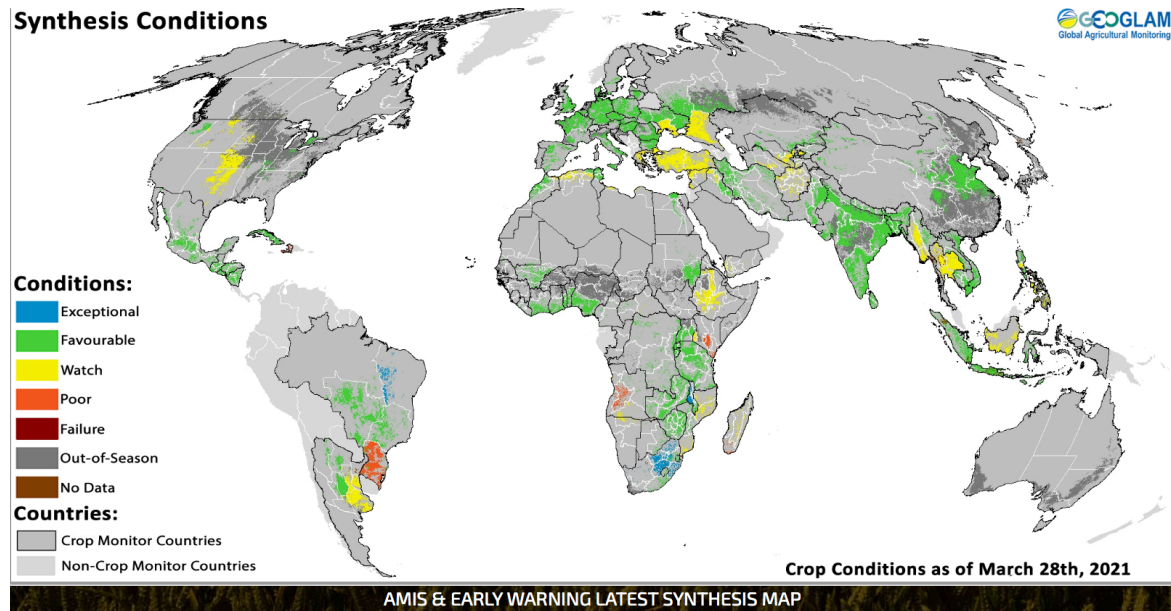
But Many **Hurdles**: Machine is still learning

- One size AI does NOT fit all Geo problems!

- Research Initiatives

  – American AI Initiative : calls for research for spatial data

  – 2017-20: DARPA [Geospatial Cloud Analytics](#)

    • Crop health, fracking, illegal fishing

  – 2020-onwards: IARPA [SMART](#) (Space-based Machine Automated Recognition Technique)

    • Spatiotemporal: Construction & classify Stage

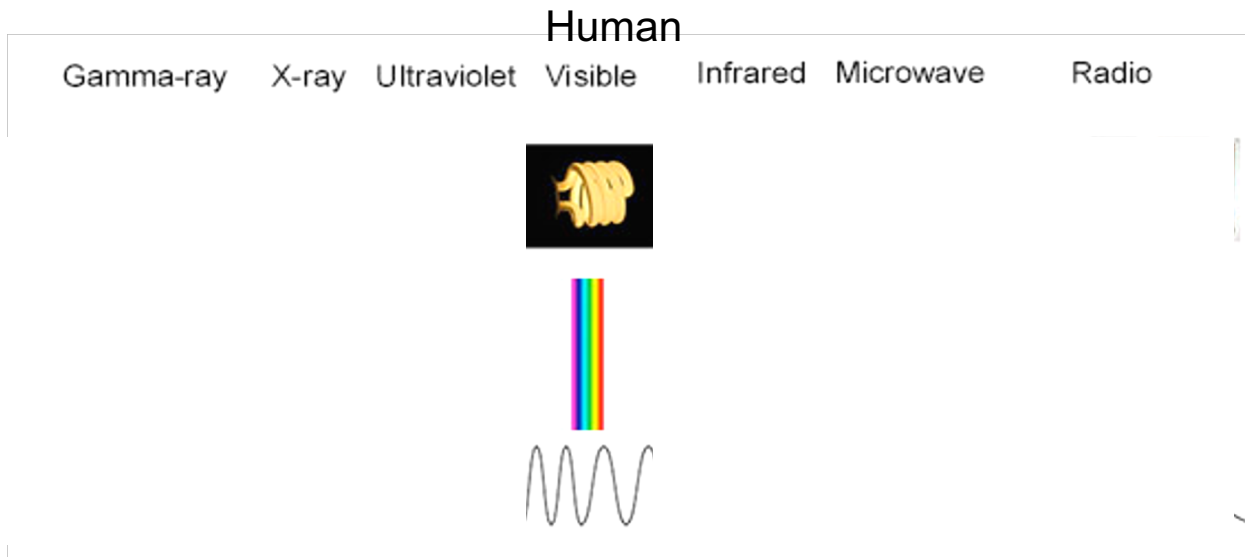   • Map Underground: ([Subterranean Challenge](#))

.

AI:

One size does NOT fit all.

A UCGIS Call to Action:
Bringing the Geospatial Perspective to Data Science Degrees and Curricula

THE NATIONAL
ARTIFICIAL INTELLIGENCE
RESEARCH AND DEVELOPMENT
STRATEGIC PLAN: 2019 UPDATE

A Report by the
SELECT COMMITTEE ON ARTIFICIAL INTELLIGENCE
of the
NATIONAL SCIENCE & TECHNOLOGY COUNCIL

JUNE 2019

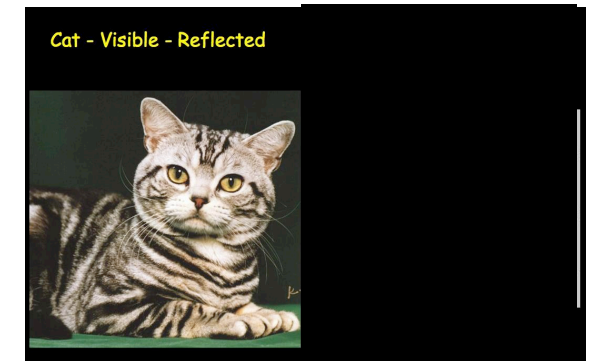# Help AI (Vision) break out of "RGB+Lidar" box to try richer sensors?

Self-Driving Cars Still Can't Handle Snow, Rain, or Heavy Weather

By Joel Hruska on October 30, 2018 at 4:53 pm | 87 Comments

- Remote Sensing has richer sensors: Electromagnetic, sonar, …

Human

Gamma-ray   X-ray   Ultraviolet   Visible   Infrared   Microwave   Radio

Cat - Visible - Reflected

Source: directthermography.co.uk

Source: imagine.gsfc.nasa.gov

Spatial Computing Research Group

Trust and Ethics: FATE debate

- **Government View:** Security, Balance prosperity and civil society
- **Business View:** Innovation critical for prosperity but carries risks
- **Civil Society View:** Risks should be disclosed

  - **F**airness (or equity) : Reduce bias across gender, race, age, …

  - **A**ccountability : Determine and assign responsibility for a machine judgement

  - **T**ransparency (or explainability): Be open and clear about (prediction) process

  - **E**thics:

    - Privacy-preserving, Use case specific dilemmas

    - Trustworhty: **S**afe (Do no harm), **S**ecure (Guard against malicious behavior)
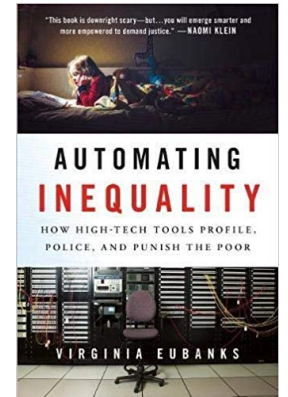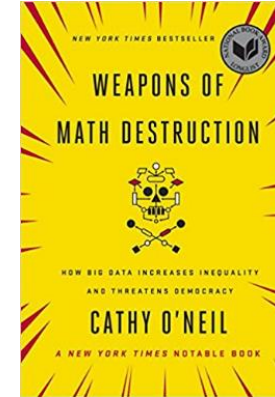
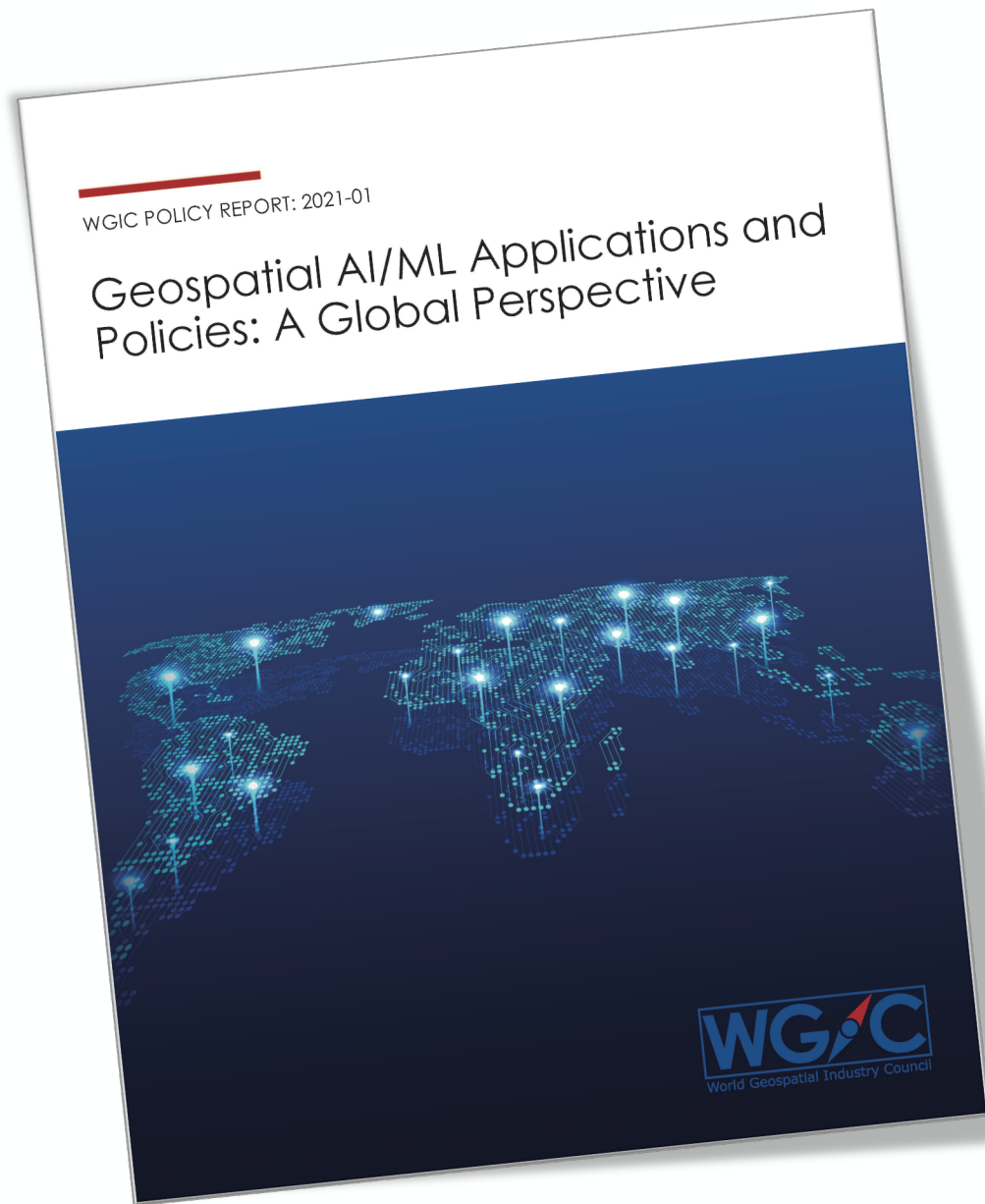More: (i) Don't let industry write the rules for AI, Y. Benkler, Nature, 569, 161, 5/1/2019.

(ii) Data for Good: FATES, Elaborated, J. Wing, Jan. 23, 2018. (iii) FAT ML and FATES Workshop

Panel Discussion

- **Kumar Navulur**, Sr. Director of Strategic Business Development, Maxar Technologies

- **Jim Van Rens**, Senior Vice President, Riegl International

- **Stephanie Leonard**, Head of Traffic Innovation and Policy, TomTom

- **Siva Ravada**, Vice President – Product Development, Oracle

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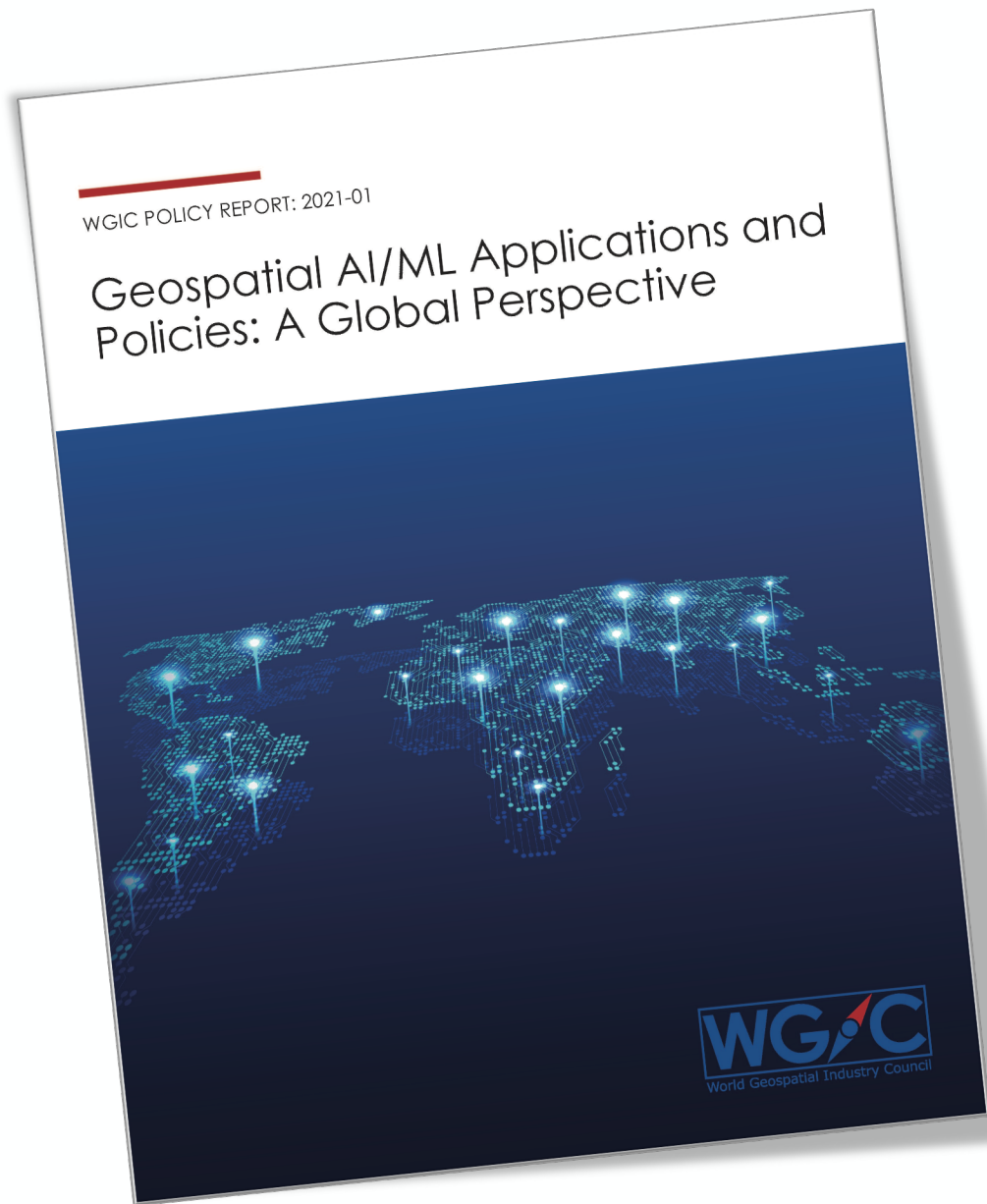
Thank you all for joining the event.

For Memberships and Partnerships, please reach us at:

info@wgicouncil.org